

## 中国丛本藓属的订正\*

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**摘要** 研究了我国南北各地的丛本藓属标本 326 号, 借阅了美国纽约植物园标本馆 (NY), 芬兰赫尔辛基大学标本馆 (H) 及日本服部植物研究所标本馆 (NICH) 的有关本属藓类各种的原模式标本 (Holotype), 等模式标本 (Syntype), 及后选模式 (Lectotype), 据模式特征, 重新订正了本属各种及中国各地标本, 将原定名为绿丛本藓 (*Anoetangium euchloron* (Schwaegr.) Mitt.) 改为丛本藓 (*A. aestivum* (Hedw.) Mitt.), 又将台湾丛本藓 (*Anoetangium fauriei* Card.) 标本归于卷叶丛本藓 (*A. thomsonii* Mitt.)。除对中国现有种作了描述讨论外, 还就模式标本绘了各种特征的解剖图, 以补原始文献缺图的不足。

**关键词** 丛本藓属, 订正

## REVISION OF THE GENUS ANOECTANGIUM FROM CHINA

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**Abstract** The authors have studied more than 300 specimens from China and the type specimens of the genus *Anoetangium*, deposited in NY, H, NICH etc. All type specimens are re-examined and illustrated from each type materials, with the result that is remedy for the original published papers, which almost had no figure issued yet. Comments are made on the revised the *Anoetangium fauriei* Card. to *A. thomsonii* Mitt. as presently constituted, *A. euchloron*(Schwaegr.) Mitt. is considered to be a synonym of *A. aestivum* (Hedw.) Mitt.

**Key words** *Anoetangium*, Revision

*Anoetangium* Scgwaegr.

Type species: *Anoetangium aestivum* (Hedw.) Mitt.

Plants small, dense tufts, yellow green, lower portion more or less tomentose. Stems erect, simple or monopodially branched; rounded-triangular in cross-section; central strand weakly differentiated or absent, outer cortical cells small and thick-walled. Leaves ovate-lanceolate to linear-lanceolate, acuminate or acute at apex; margin flat or carinate, entire or crenate at shoulder portion of base. Costa excurrent or percurrent, strongly kelled; adaxial surface cells large, oblong, thick-walled, smooth; abaxial surface cells

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small, lineal-rectangular, papillose, adaxial stereid band absent in cross section. Laminal cells irregularly quadrate, hexagonal more or less round, with roundly pluripapillose; basal cells enlarged, irregularly rectangular, smooth, yellowish-green to hyaline. Inner perichaetial leaves broad-oblong, attenuate, length of costa ending below apex. Dioicous. Archegonia on short, lateral branches, endosed by broad-ovate to lanceolate perichaetial leaves. Seta yellowish-brown, or reddishbrown, more or less twist. Capsule ovoid to short cylindrical; exothecial cells irregularly oblong. Stomata phaneropore on neck, 4~8 per capsule. Annulus absent. Operculum with a long, oblong beak. Calyptra cucullate. Peristome teeth absent. Spores brownish-green, pluripapillose.

The genus has about 56 species in the world; 5 species are recognized for China.

### Key to the Chinese species of genus *Anoetangium*

1. Leaves shorter (0.4~1 mm), oblong-lanceolate or ovate-lanceolate; costa ending below apex . . . . . 2
1. Leaves longer (1~2 mm), ovate-lanceolate or linear-lanceolate; costa percurrent or short excurrent . . . . . 3
2. Leaves acute at apex; margin crenulate at base; median laminal cells with roundish pleuripapillose  
. . . . . ***Anoetangium aestivum***
2. Leaves obtuse at apex; margin quite entire; median laminal cells with roundish unipapillose . . . . . ***A. crassinervum***
3. Leaves linear-lanceolate, contorted when dry; leaf margin constricted above base; costa excurrent  
at apex, with densely rough papillae on dorsal surface . . . . . ***A. stracheyanum***
3. Leaves ovate-lanceolate, involuted when dry; leaf-margin constricted at base, broad above; costa percurrent  
or ending below apex, smooth or with loosely slender papillae on dorsal surface. . . . . 4
4. Stems ca 1 cm long; leaves incurvate, strongly corinate; basal laminal cells oblong-rectangular or ovate-rectangular,  
cell wall thin, usually with papillose, not pellucid, undifferentiated area at laminal base . . . . . ***A. thomsonii***
4. Stems ca 2 cm long; leaves erect patent, weakly carinate, basal laminal cells narrow rectangular, cell wall thick,  
without papillae, pellucid, more or less with rounded differentiation area at laminal base . . . . . ***A. clarum***

***Anoetangium aestivum***(Hedw.) Mitt., J. Linn. Soc. Bot. 12: 175. 1869. Figs. 1: a~g

Syn. *Gymnostomum aestivum* Hedw., Spec. Muse. 32, 1801.—*Anoetangium compactum* Schwaegr., Spec. Muse. Suppl. 1(1):11, 1811, nom. illeg.—*Anoetangium euchloron* (Schwaegr.) Mitt., J. Linn. Soc. Bot. 12: 176, 1869.—*Gymnostomum euchloron* Schwaegr., Spec. Muse. Suppl. 2(2):83, 1827.—*Anoetangium tenellum* (Mitt.) Par., Ind. Bryol. 41, 1894.—*Angostroemia nipponica* Sak., Bot. Mag. Tokyo 51:793. f. 3, 1937.

Plants in densely tufted, light green. Stems erect, unbranched, length and width of stems with leaves in dry ca. 15~20 mm × 1~1.5 mm. Leaves imbricate to stem when dry, erect-spreading when moist, ovate-lanceolate or oblong-lanceolate, 1~1.7 mm long, 0.2~0.3 mm wide, acute at apex; margin crenate at shoulder portion of base. Laminal cells irregularly quadrate to round, 5~8 μm long, 6~10 μm wide; basal cells irregularly oblong to lineal-rectangular, thick-walled. Costa ending below apex. Perichaetial leaves smaller, broad-ovate to ovate-lanceolate, 0.5~0.8 mm long, 0.2~0.3 mm wide. Sporophyte not seen.

This species is characterized by (1) Leaves usually shorter, ovate or ovate-lanceolate; (2) Costa always below the apex of leaves; (3) leaf margin crenulate at base.

Hab: On rocks or rock-crevices in alpine and subalpine regions.

Distribution: China (NE and SW alpine zone), W. Himalayas, Kashmer, Philippines, Japan, Europe, Africa, North & South America.

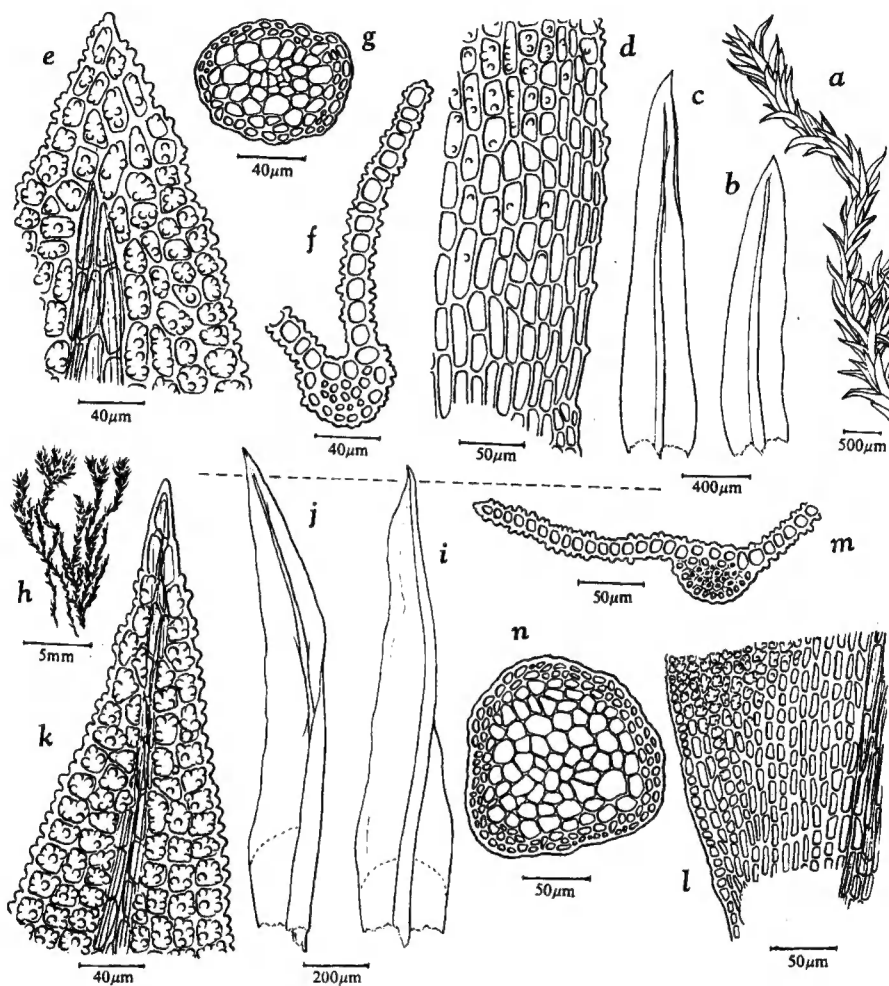


Fig. 1. *Anoctangium aestivum* (Hedw.) Mitt. a. stem with leaves in wet; b-c. leaves; d. margin cells of leaf-base; e. cells of leaf-apex; f. cross-section of medial leaf; g. cross-section of stem. [a-g drawn from Sichuan, Lu Ding. Gung Ga Snow Mts., Y. Xuan, no. 200 (HKAS) ]

*Anoctangium clarum* Mitt. h. plant; i-j. leaves; k. cells of leaf-apex; l. cells of leaf-base; m. cross-section of medial leaf; n. cross-section of stem. [h, k drawn from Tibet, San An Qu Lin, M. Zang, on. 1481a (HKAS); i, j, l-n drawn from lectotype of himalayae, Sikkim, J. D. Hooker, no. 203 (NY) ]

Chinese selective specimens examined: Heilungjiang: Xioxinganling (Mts.), Q. Gao, no number (IFP); Ningan xian X. L. Zhu 260 (PE). Jilin: Laoyeling (Mts.), Q. Gao 1562 (IFP). Henan: Xixia Z. J. He 6816 (HKAS); Anyang H. J. Yu 1012, 1032, 58012 (HKAS). Shantong: Tai Shan, Q. Gao 34025 (IFP). Shanxi: Hu xian, Guantao Shan, Z. P. Wei 4561 (HKAS). Anhwei: Yellow Mts. Yun Gu Temple, D. K. Li 611 (SHM), Xie xian Qing Liang Tai, W. F. Zheng 1013 (HKAS). Jiangsu: Nanjing, Zijien Shan M. Zang 8

(HKAS), Qixia Shan, X. J. Li 56001 (HKAS). Zhejiang; Western Tianshan. M. Zang 211 (HKAS). Fujian: Wuyi Shan. X. J. Li 252 (HKAS). Sichuan: Xiangcheng Shan, Su Qu River, X. J. Li 81-2802, 81-2804 (HKAS); Lu Ding, Gungqasnow Shan. Y. Xuan 200 (HKAS). Yunnan: Du Lung River Area, M. Zang 9840 (c) (HKAS); Kunming, C. Y. Yang 383 (PE). Tibet: Ka Nu La Glacier, M. Zang 820 (HKAS); Ya Dong, Chen Pei River, M. Zang 89 (HKAS).

**Anoetangium clarum** Mitt. J. Linn. Soc. Bot. Suppl. 1: 31, 1859. Figs. 1: h~n

Type: In Himalayae, Sikkim, J. D. Hooker, no. 203 (Lectotype, NY !); no. 201' (Syntype, NY !).

Syn. *Anoetangium latifolium* Broth. in Handel-Mazzetti, Symb. Sin. 4: 31, 1929.

Plants forming densely tufted, yellow green. Stems with leaves 10~22 mm long, 0.5~1.5 mm wide when dry, stems simple or monopodial, outer cortical cells small and thick-walled in cross section of stem, central strand absent. Leaves appressed to stem at base, involute or contorted above when dry, erect-spreading flat when moist, lanceolate or linear-lanceolate, 1~1.77 mm long, 0.2~0.4 mm wide, acuminate at apex, margin carinate entire. Costa excurrent as a sharp point. Median laminal cells irregularly round 6~12  $\mu\text{m}$   $\times$  8~14  $\mu\text{m}$  thin-walled, pleuripapillose, round shape of papillae; basal lamina cells irregularly narrow-rectangular, thin-walled, smooth, 10~26  $\mu\text{m}$   $\times$  4~8  $\mu\text{m}$  narrower and shorter toward margin more or less with rounded differentiation area at laminal base, lineal-rectangular in abaxial superficial cells of costa above middle leaf. Inner perichaetial leaves smaller. Seta 12~14 mm long, reddish brown, not twist. Capsule short-cylindrical, ca 0.6 mm long, ca 0.4 mm thick. Spores 17~20  $\mu\text{m}$  in diam.

*Anoetangium clarum* is easily differentiated with another species of this genus by (1) Stems often more than 2 cm long; (2) Leaves flat when moist; (3) More or less with rounded differentiation area at laminal base.

Hab.: On basic rocks, especially beside forest, stone wall or crevice, common in alpine region.

Distribution: China, NW-Himalayas, Sikkim, Nepal and Burma. It is a typical Sino-Himalayan floristic species.

Chinese selective specimens examined: Henan: Lin Xian, Taihung Shan. D. X. Ye 2a (PE); Shaanxi: Hu Xian, the peak of Guangtao Shan, Z. P. Wei 4342, 4632 (HKAS); in same locality, M. Wang 227, 305 (HKAS). Taiwan: Ali Shan and Tong-pu, Z. Iwat., A. J. et Evelyn Sharp 622 (NICH); Hsueh Shan Mo, Anna Shan, Z. Iwat., A. J. et Evelyn Sharp, 1342 (NICH). Sichuan: Kong Ding, X. S. Duan 1164, 46202 (PE); Du Kao, K. K. Chen 27 (HKAS). Yunnan: Kunming, Western Shan. L. S. Wang 81 (HKAS); Dali, Handel-Mazzetti 1138, 6393, 6462 (H). Tibet: San An Qu Lin, M. Zang 1481a (HKAS); Motou, Ma Ni Oun, Y. G. Su 4997 (HKAS).

**Anoetangium crassinervium** Mitt., J. Linn. Soc. Bot. Suppl. 1: 31, 1859. Figs. 2: a~i

Type: China, Tibet. Occid. reg. temp. T. Thomson, no. 127 (Holotype, NY !).

Plants forming densely tufted, yellow green, stems with leaves 6~10 mm long, 0.5~1 mm wide when dry. Stems unbranched or monopodial, outer cortical cells small and thick-walled in cross section, central strand absent. Leaves involute when dry, oblong-ovate or oblong-lanceolate, 0.4~1 mm long, 0.2~0.3 mm wide, obtuse or more or less acute at apex; basal portion hardly widened and not constricted; margin flat and entire. Laminal cells irregularly quadrate, or more or less hexagonal, 4~12  $\mu\text{m}$  long, 4~8  $\mu\text{m}$  wide, thin-walled, with roundish unipapillose; basal cells irregularly rectangular, 12~28  $\mu\text{m}$  long, 8~12  $\mu\text{m}$  wide; abaxial superficial cells lineal-rectangular of costa above middle leaf. Sporophyte unknown.

This species can be distinguished by its several characters as follows:

(1) Leaves shorter, oblong-lanceolate or ovate-lanceolate; (2) Costa ending below apex; (3) Leaves obtuse at Apex; (4) Median laminal cells with roundish unipapillose.

Hab: On rocks, in alpine region.

Distr.: Chiona (endemic in tibet).

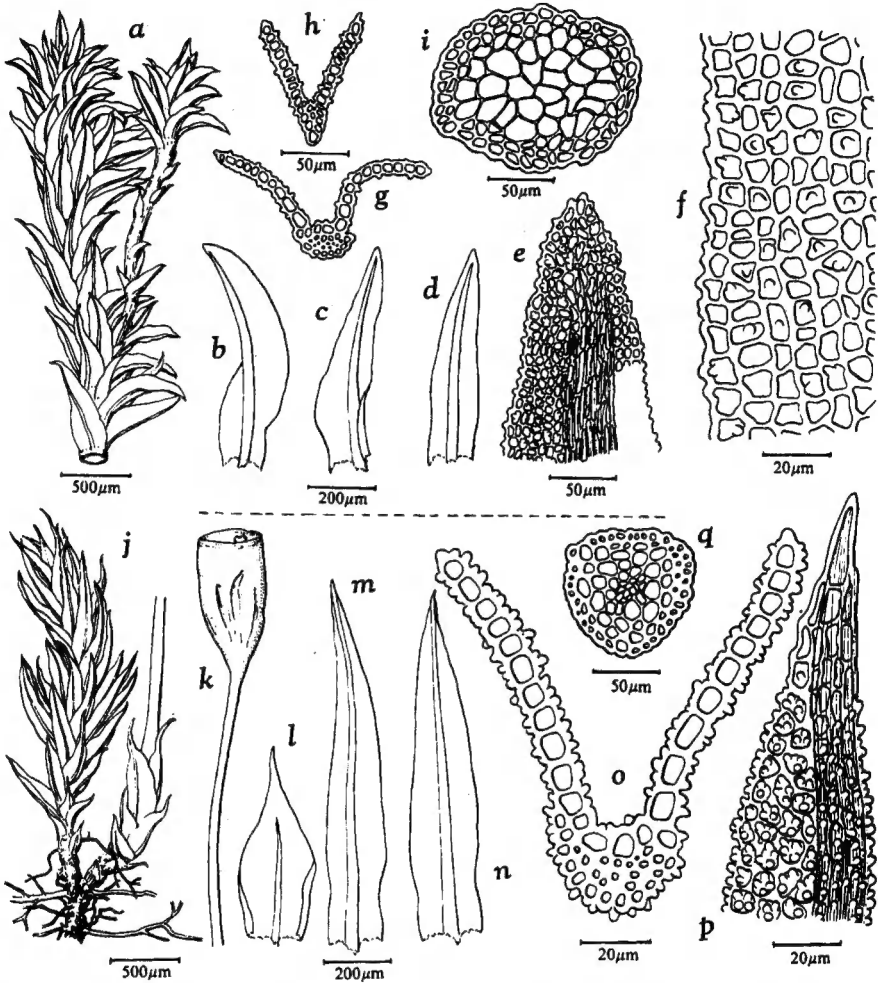


Fig. 2 *Anoectangium crassinervium* Mitt. a. wet stem with branch; b-d. leaves; e. cells of leaf-apex; f. margin cells of leaf-medial; g. cross-section of medial leaf; h. cross-section of leaf-apex; i. cross-sectional of stem. [a-i drawn from Holotype of Tibet, occid., reg. temp., T. Thomson, no. 127 (NY)].

*Anoectangium stracheyanum* Mitt. j. wet stem with perichaetium; k. capsule; l. perichaetial leaf; m-n. leaves; o. cross-section of medial leaf; P. cells of leaf-apex; q. cross-section of stem. [j-p drawn from Lectotype of Himalayas boreali-occident., Kumaon, Strachey and Winterbttom, 2 no, 19 (NY)]

Chinese selective specimens examined: Tibet: Occid. reg. temp. T. Thomson, no 127 (Holotype from NY !)

*Anoectangium stracheyanum* Mitt., J. Linn. Soc. Bot. Suppl. 1: 31, 1859. Figs. 2: j~q

Type: In Himalayas boreali-occident, Kumaon, coll. Strachey & Winterbttom, no. 19 (Lectotype,

NY!); In Himalayas boreali-occident. T. Thomson, no. 207 (Syntype, NY!).

Syn. *Anoetangium tortifolium* Jaeg., Ber. S. gall. Naturw. Ges 1869-70: 286, 1870. — *Anoetangium gymnostomoides* Broth. et Yas., Bot. Mag. Tokyo 29:150, 1915. — *Anoetangium leptophyllum* Broth., in Handel-Mazzetti, Symb. Sin. 4: 30, 1920. — *Anoetangium perminutum* Broth., Sitzungsber. Ak. Wiss. Wien, Math. Nat. Kl. Abt. 1, 133: 563, 1924. — *Anoetangium tortifolium* Jaeg. var. *gymnostomoides* (Borth. et Yas.) Chen, Hedwigia 80:47, 1941. — *Anoetangium stracheyanum* var. *gymnostomoides* (Broth. et yas.) Wijk et Marg., Taxon 7: 288, 1958.

Plants forming densely tufted, yellow green. STems with leaves in dry, 5~14-(16) mm long, 0.5~1-(1.5) mm wide; branching of shoots sympodial; outer cortical cells small and thick-walled in cross section of stem, central strand weakly differentiated. Leaves crisped or contorted when dry, spreading when moist, lanceolate or linear-lanceolate, 0.8~2 mm long, 0.15~0.3 mm wide, acuminate or more or less acute at apex, always constricted above base; margin entire above at shoulder portion of base, crenulate, which composed by papillae. Costa short-excurrent; adaxial stereid band absent in cross section. Median laminal cells irregularly hexagonal to round,  $5\sim12 \times 6\sim10 \mu\text{m}$ ; basal laminal cells irregularly rectangular to oblong,  $8\sim10 \mu\text{m} \times 6\sim12 \mu\text{m}$ , thick-walled, smooth; abaxial superficial cells of costa above middle leaf line-rectangular. Inner perichaetial leaves broad-oblong, attenuate, 0.4~1 mm long, 0.2~0.5 mm wide; costa ending below apex. Seta yellow-brown, 6~10 mm long, more or less twist. Capsule erect, ovate to short-cylindrical, ca 1.2 mm long, stomata 4~5 in basal of capsule, columella present. Spores round, pale brownish-green, 10~13  $\mu\text{m}$  in diam.

Mitten (1859) recognized two specimens numbers as the syntype of *Anoetangium stracheyanum*, which all collected from Himalayas boreali-occident area, one is no. 19, collected by Strachy & Winterbottom, the other is no. 207, collected by T. Thomson. After re-examination of those collections and compared the original description, the authors inclined to consider that it is reasonable to select an intact one as number 19 is a lectotype, the no. 209 is keep as a syntype as it was before.

This species can be recognized by following characters: (1) Leaf margin constricted above base; (2) Abaxial superficial with densely rough papillose of cost above middle leaf; (3) Leaves linear-lanceolate, contorted in dry.

Hab.: usually growing on rocks or boulder in alpine region (often near 5000 m.) also occur in lower area, on stone-wall or crevice.

Distr.: China, Japan, India, Burma, Nepal and Sikkim.

Chinese selective specimens examined; Jilin: Chiang bei Shan, Q. Gao 7845 (IFP). Hebei: Xiowufan Shan. K. J. Guan 44 (PE). Beijing: Mi Yun Water Reserv. K. J. Guan B2 (PE). Henan: Lin Xian, Tai huan Mts. D. X. Ye 2 (HKAS); Qi Wang Village, Z. Z. He 6816 (HKAS). Shanxi: Ning Wu, Guan qian Shan, Q. Gao 30862 (IFP). Shaanxi: Hu Xian, Guantao Shan, M. Wang 240 (HKAS); Taibei Shan southern slope, Z. P. Wei 6597 (HKAS). Anhwei: Xie Xian, Qingliang feng Shan. W. F. Zheng 610 (HKAS). Zhejiang: western tian mu Shan. M. Zang 481 (HKAS); in same locality, R. L. Hu 14301, 143 (d) (HSNU). Jiangxi: Lu Shan, Xian Ren Cavity, M. Zang 211 (HKAS). Fujian: Xia Men, south Putao Shan, D. K. Li 10957 (SHM). Taiwan: Hua Lian Co., Shyu Lin Village, T. Kop. 18335 (H); Hsueh Shan Mo, Tungshih, Z. Iwat., A. J. & Evelyn Sharp 3007 (NICH). Guangdong: Lia Xian L. Chang 737, 773 (IBSC). Hunan: Da Yung, Chang Jia Jie, D. K. Li 18133 (SHM). Sichuan: O-mei Shan. Da Ching Temple, D. K. Li 15571 (SHM); Ma Er Kong, Wang Jia Village, X. J. Li 1539 (HKAS). Guizhou: Guiyang, Chian Ling Mts. B. G. Tsong

150 (HKAS). Yunnan: Kunming, Western Shan. X. J. Li 263 (HKAS); Lijiang, Yulong Shan. X. J. Li 81–721 (HKAS). Tibet: Himalayas boreali-occident, Kumaon, coll. Strachey & Winterbottom 19 (Lectotype ! NY); in same locality, T. Thomson 207 (Syntype ! NY); Loung-Zi Xian, Zun Ba Village, M. Zang 1122 (HKAS).

**Anoetangium thomsonii** Mitt., J. Linn. Soc. Bot. Suppl. 1: 31, 1859. Figs. 3: a~o

Type: In Himalayas, Sikkim, T. Thomson, no. 156 (Lectotype NY !); in same locality, T. Thomson, no. 153, 199 (Syntype NY!).

Syn. *Anoetangium crispulum* Wils., Kew J. Bot. 9: 32, 1857. nom. nud. — *Anoetangium pulvinatum* Mitt., Trans. Linn. Soc. Bot. n. ser. 3: 160, 1891. hom. illeg. — *Anoetangium laxum* C. Muell., Nuov. Giorn. Bot. Ital. N. ser. 5: 187, 1899. — *Anoetangium fauriei* Card., Beih. Bot. Centralbl. 19(2): 90, 1905. — *Anoetangium subpulvinatum* Broth., Sitzungsber. Ak. Wiss. Wien, Math. Nat. Kl. Abt. 1, 133: 563, 1924. — *Anoetangium schensianum* C. Muell., Nuov. Giorn. Bot. Ital. n. ser. 4: 260, 1927. — *Anoetangium kweichowense* Bartr., Ann. Bryol. 8: 9, 1935.

Plants densely tufted, yellow green. Stems with leaves in dry 3~10 mm long, 1~1.5 mm wide, unbranched; outer cortical cells small and thick-walled in cross section of stem, central strand absent. Leaves involute or contorted when dry; ovate-lanceolate or oblong-lanceolate, 0.5~1.5 mm long, 0.2~0.3 mm wide, acuminate or acute at apex; basal area often hardly widened, not constricted above base; margin plane, more or less ciliate, entire, not decurrent on stem. Costa percurrent or ending below apex, median laminal cells round or quadrate, 6~14  $\mu$ m long, 6~11  $\mu$ m wide, with roundish pluripapillose; basal cells slightly enlarged, rectangular or short-oblong, narrower and shorter towards margin, papillose or smooth; abaxial superficial cells of costa above middle leaf lineal-rectangular. Inner perichaetial leaves broad-ovate, acute at apex. Seta 6~7 mm long, yellow brown, more or less twist. Capsule short cylindrical 0.5~0.8 mm long, erect. Columella present.

Mitten (1859) published *Anoetangium thomsonii*, recognized several specimens as syntype, which collected from Himalayas, Sikkim, by T. Thomson, no. 153, 156, 158, 197 and 199; the others such as no. 200, 201 collected by J. D. Hooker from Sikkim; Royle, Strachey & Winterbottom no number from N. W. Himalayas, all of those specimens, the authors have a chance to re-examine them, and to select the no. 156 as a lectotype, no. 153, 199 as syntype; but the another specimens would be change to the other taxa, e. g. T. Thomson, no. 197 and J. D. Hooker, no. 200 is *Anoetangium stracheyanum* Mitt.; T. Thomson, no. 158, J. D. Hooker, no. 201 and Royle & Strachey et Winterbottom which are no number, they are reasonable belonging to *Anoetangium Clarum* Mitt..

Hab: On rocks or Cliffs, in lowland or mountainous areas.

Distribution\*: China, Japan, India, Burma, Nepal, Sikkim, Far eastern area of Russia.

Chinese selective specimens examined: Helongjiang: Xiang Zhe Xian, Mao er Shan. Z. W. Ao 8531 (IFP). Jilin: Changbei Shan. Q. Gao 7854 (IFP). Liaoning: Been Xi Xian, Q. Gao 8328 (IFP). Hebei: Dong Ling, L. C. Yu 285, 289 (PE). Henan: Lanshan Xian, D. J. Tu 3102 (PE); Son Xian, Wu Ma Temple, J. X. Lo 460 (PE). Shaanxi: Taibei Shan. Z. X. Peng 15 (HKAS); Ho Di Gao Village, P. C. Chen 44 (PE); Taibei Shan. X. J. Li 535 a (HKAS). Anhwei: Yellow Shan. P. C. Chen 7399 (PE); Xie Xian, Qing Liang Feng peak, W. F. Zheng 199 (HKAS). Zhejiang: Chinglung Shan. M. Zang 210 (HKAS). Fujian: Wuyi Shan. D. K. Li 11761 (SHM). Taiwan: Hsueh Shah Mo, Z. Iwats., A. J. & Evelyn Sharp 1074 (NICH); Pai-mu lin, Shan Morrison, Z. Iwats., A. J. & Evelyn Sharp 2369 (NICH). Guangdong: Lian Nan Xian, L.

Chang 891 (HKAS). Sichuan: Ma Er Kang, X. J. Li 1179 (HKAS); Du Ko, Yian Bian Xian L. S. Wang 83205 (HKAS). Yunnan: Jijiang city, X. J. Li 85-0023 (HKAS); Du Lung River area, M. Zang 3587 (HKAS). Tibet: Long Xian, M. Zang 1730 (HKAS); Ya Dong Xian, M. Zang 306 (HKAS).

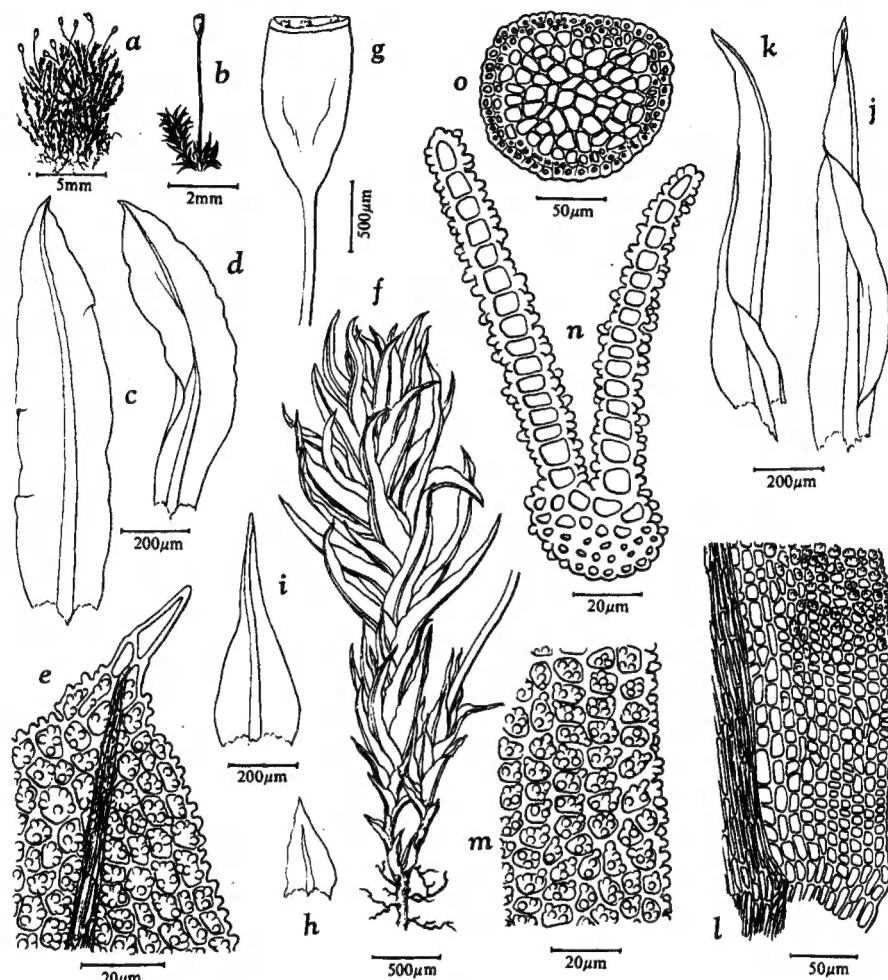


Fig. 3 *Anoetangium thomsonii* Mitt.

a. dry plant; b. stem with sporophyte; c-d. leaves; e. cells of leaf-apex; f. stem with perichaetium; g. capsule; h-i. perichaetial leaves; j-k. leaves; l. cells of leaf-base; m. margin cells of leaf-medial; n. cross-section of leaf; o. cross-section of stem. [a-e drawn from Tibet, Yadong County, M. Zang, no. 306 (KUN);; f-o drawn from lectotype of Himalayas, Sikkim, T. Thomson, no. 156 (NY)].

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